Multi disciplinary geophysical view of the Variscan Orogenic Belt in South-Western Iberia

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Résumé

Perhaps one of the best surface exposures of the European Variscan Belt is located within the South and Southwestern part of the Iberia Peninsula. It is also one of the most and best studied sections of an orogenic belts. These studies include multi seismic (normal incidence and wide angle) reflection profiles (IBERSEIS and ALCUDIA), potential field (including Magnetotelurics, Gravity) and lately regional heat flow (Curie Depth Analysis). Integration of these multi-disciplinary data and data products is carried out. This contribution is an attempt to unravel nature of the main architectural features imaged within the crust and upper mantle as well resolving the role played by the most outstanding crustal and intra-crustal discontinuities. These targets are addressed within the light of correlations between the different data and data products, that is seismic reflection signatures, velocity anomalies (and Poisson's ratio) and estimated thermal field. For example: seismic transparent zones featuring relatively high values of Posion's ratio are consistent with increase quartz (perhaps granite with high Si content). Further examples include: coincident relatively high seismic velocities, high conductivity and high amplitude multi-cyclic reflective patterns which are consistent with layered mafic intrusions. The multi seismic reflection data reveals a crust featuring two mayor levels characterized by contrasting internal structures. The upper and the lower crust limited by a thin marker at mid crust located at, approximately, 14-17 km depth. The estimated thermal field (estimated isotherm) seems to suggest a correlation with the brittle-to-ductile transition. This mid crustal discontinuity most probably has acted as a localized detachment zone. This discontinuity, also marks a P-wave velocity increase, nearly continuous along the entire orogen suggesting an orogen-scale boundary with characteristics compatible with those of the globally debated Conrad discontinuity. The geophysicals constraints on the crust-mantle boundary (Moho) are also placed and its nature and role in the orogenic evolution is also discussed.

Mots-Clés: Variscan Orogenic Belt, Seismic Reflection, Geophysical Properties, Poisson's Ratio, Conrad Discontinuity, Moho, Crustal Heat Flow

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